



American Zinc Institute, Inc.

advantages and uses of zinc for architectural applications

Zinc is a non-ferrous metal which is particularly well suited for use in building construction. For that purpose it is produced in sheet, strip, ribbon and rod from primary zinc as it comes from the smelter. It has many unique chemical and mechanical characteristics. Easily worked, zinc provides long service at reasonable cost in architectural applications.

When exposed to the atmosphere, as on a roof, zinc forms its own protective coating, which is highly tenacious and practically indestructible under ordinary conditions of usage. Resistant to rust and corrosion, this coating has approximately the same coefficient of expansion as zinc itself, so that it does not peel off with temperature changes. It is fire and spark resistant.

Application guide

forming For best results, all forming surfaces should be clean, smooth and edges free from burrs. All bends should be rounded without sharp angles. Acute bends cause the metal to pinch or even cut slightly. Thus the bend becomes a point of weakness rather than strength in the finished job.

When zinc is bent back on itself the angle should have a radius similar to the rib in weatherstrip. This is done by inserting a forming strip not less than 1/16 of an inch thick in the fold before bending.

While zinc can be worked at lower temperatures, for severe forming it is recommended that the metal be above 60°F.

sheet length Because of expansion and contraction due to temperature changes, individual sheet lengths in excess of eight feet are not generally recommended.

joints Conventional methods of joining, such as single or double lock seams are used. If individual sheets are joined by soldering, expansion joints must be placed at intervals of approximately 15 feet for best results.

solder Zinc is easily soldered if simple and proper preparation is made. The surfaces to be soldered should be carefully cleaned of all traces of grease, dirt and oxide.

Cut or "killed" hydrochloric acid (muriatic) makes the best and most generally used flux, but some resin fluxes can also be employed. Half and half (50% tin — 50% lead) anti-mony-free solder should be used with moderately hot, heavy soldering iron while the surfaces to be treated are still moist with the flux. For best results, the iron should not be allowed to become red hot or applied longer than necessary. After the solder has hardened, all traces of acid or flux should be removed.

clips All sheet and strip zinc should be held in place by clips of a size and type determined by construction requirements, rather than by direct nailing. For securing clips, nails should be zinc-coated (galvanized) or of solid zinc with large flat heads and sharp points. These should be of sufficient length to penetrate wood sheathing or framing not less than 7/8ths of an inch.

sheathing paper Sheet and strip zinc should always be laid over a good grade of asphalt saturated and coated sheathing paper which has a glossy surface.



Zinc is soft enough to be readily formed and worked without the use of special tools, yet it is strong enough for many sheet metal applications. It retains its ductility when subjected to forming operations and does not work harden appreciably or become brittle.



The corrosion resistant properties of zinc make it well suited for application near the ocean. Tested in long-time service installations, it has given good service in salt atmosphere.

Zinc may be embedded in cement, mortar, or plaster, where it will adhere firmly and permanently. This is important in such applications as chimney flashings, thru-wall flashings, and terrazzo strips.



The natural color of zinc, a pleasing gray, blends well with other construction materials and will not stain the surrounding walls or paint trim.



electrolytic action Zinc can be used safely in direct contact with lead, tin and aluminum. With other metals, insulation is required at point of contact to avoid any possibility of electrolytic action.

with lumber Zinc is not affected when installed in contact with lumber in general. However, when used in conjunction with redwood or red cedar, the zinc should be coated with asphaltum paint.

paint Zinc weathers naturally to an attractive dull gray coating which affords long range durability so that no additional protection such as paint is required. If a decorative finish is desired the best paint for zinc is Metallic Zinc Paint (Zinc Dust-Zinc Oxide) which is available in natural gray, red and green. If some other color is desired a second coat of house paint should be used over a primer coat of Metallic Zinc Paint. Ordinary precautions should always be taken to secure a clean surface by brushing off loose dirt and removing oil or grease with a solvent such as turpentine or mineral spirits.

proper thickness of metal Architects and builders should be careful to specify the thickness of the zinc to be used, as metal of too light a gauge will not give satisfactory service. Zinc under .018" thick should never be used for general sheet metal work. For best results, thicknesses of .020" (equivalent to thickness of 16 oz. copper) or greater are recommended.

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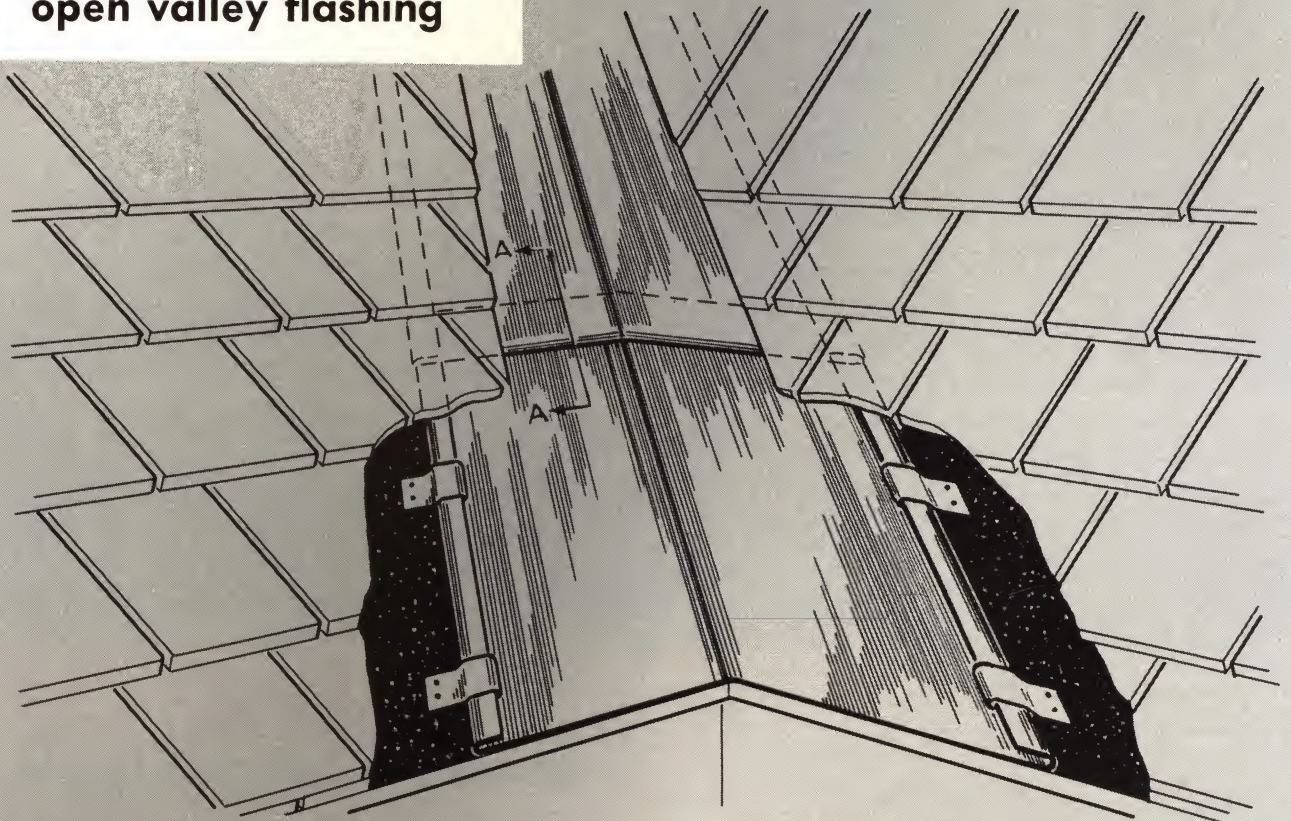
technical data

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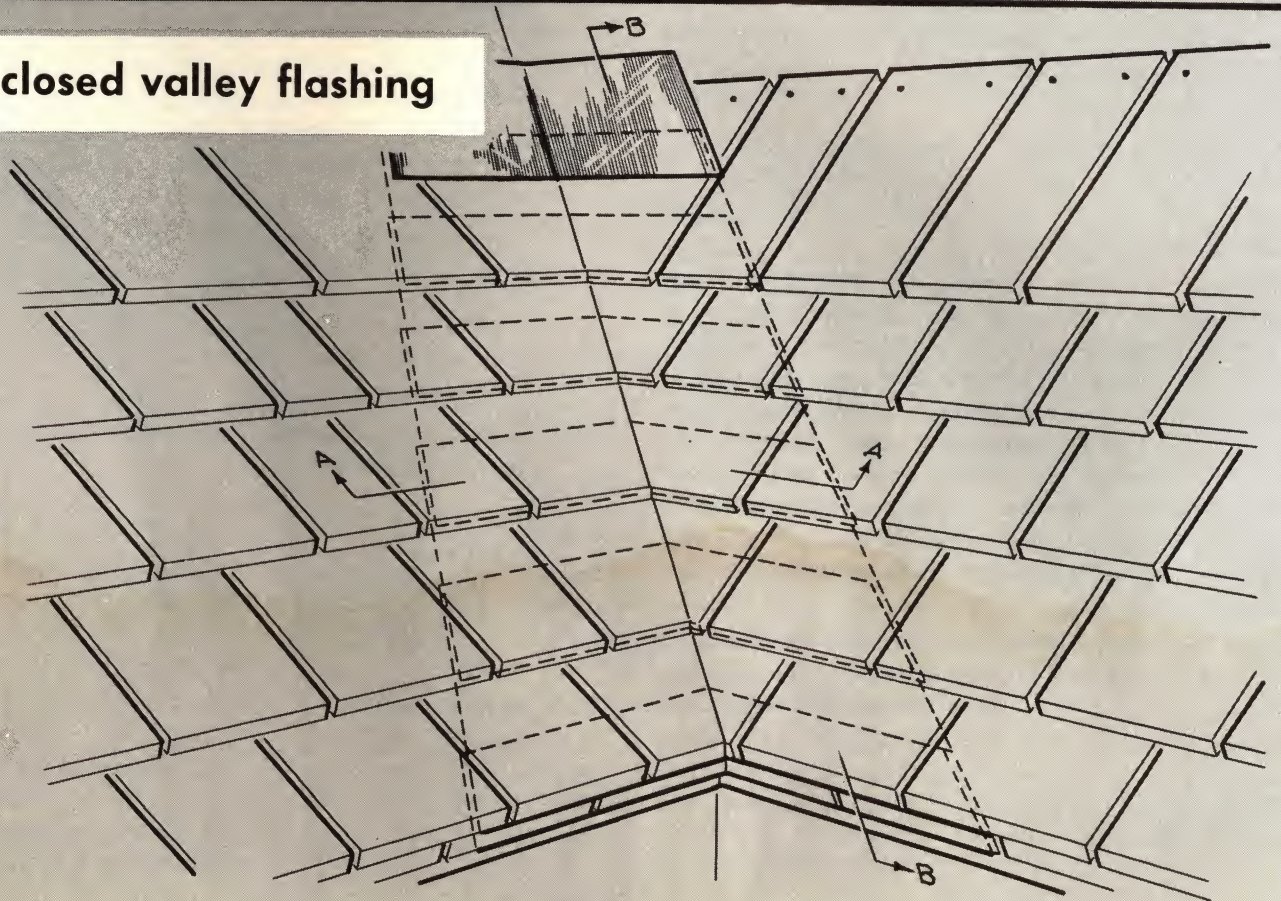
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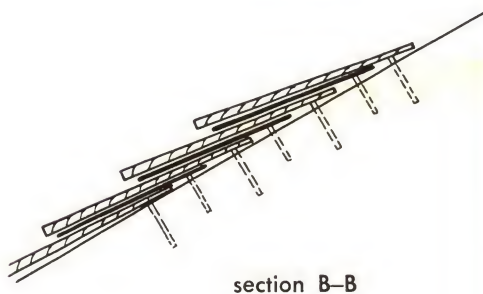
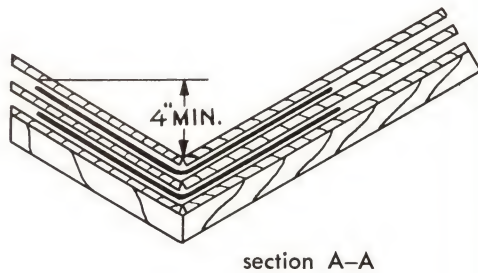
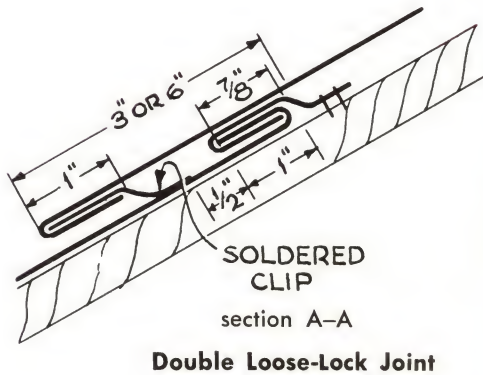
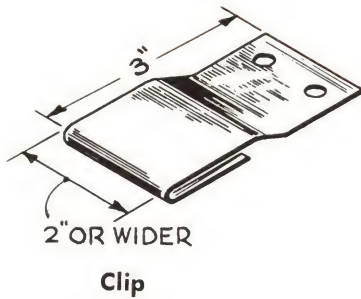
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open valley flashing



closed valley flashing





open valley flashing

Zinc valley sheets should be no more than 8 feet in length and must be installed with the use of clips. Sheets are laid over asphalt saturated and coated sheathing paper with a glossy finish and should extend under the roofing as far as possible without coming in contact with the nails which hold the shingles to the roof. Unless care is taken, the nails may puncture the zinc and cause seepage of water. Proper installation (see drawing), which provides for expansion and contraction will assure maximum service.

roofs with moderate pitch

For slopes of 2 to 4 inches per foot, double loose-lock joints with a covering of 6 inches are used. For slopes of 4 to 6 inches per foot, double loose-lock joints with a covering of 3 inches are used.

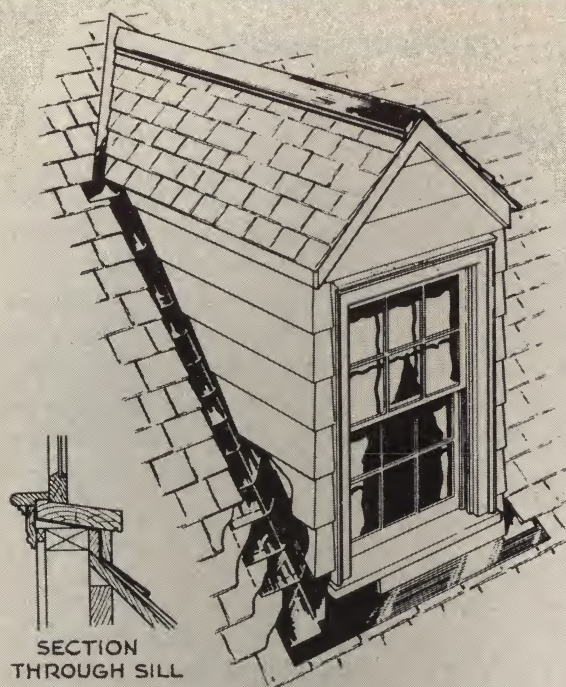
roofs with steep pitch

For slopes greater than 6 inches per foot the valley may be formed by overlapping zinc sheets. These are fastened at the top only with zinc-coated (galvanized) or solid zinc nails with large heads and sharp points. At the bottom the valley sheets overlap the next lower sheet a minimum of six inches. The side edges are folded back on themselves and held in place by clips as illustrated.

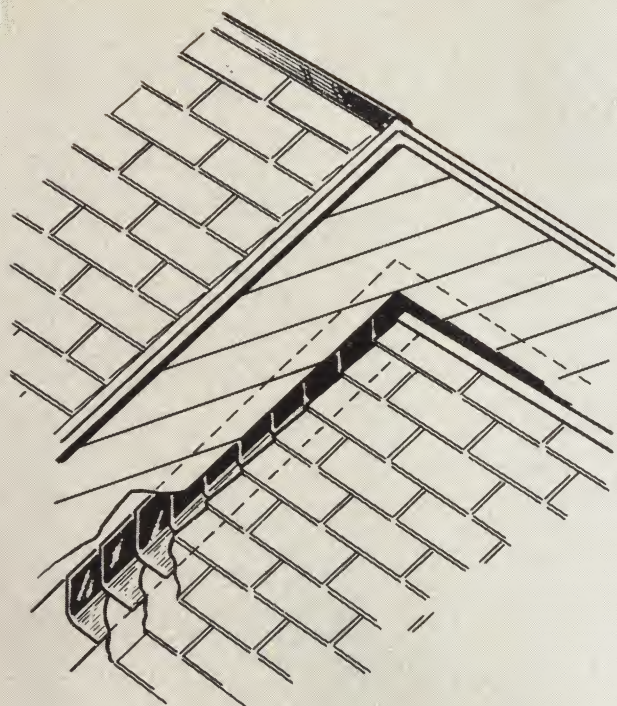
closed valley flashing

When necessary to make a closed valley, separate pieces of zinc are installed with each roofing course and fastened with large headed galvanized or zinc roofing nails. These pieces must extend about 2 inches beyond the top of the shingles, where they are nailed, and should extend down as far as possible but be hidden by the next higher row of shingles.

dormers • sidewalls • hips • ridges

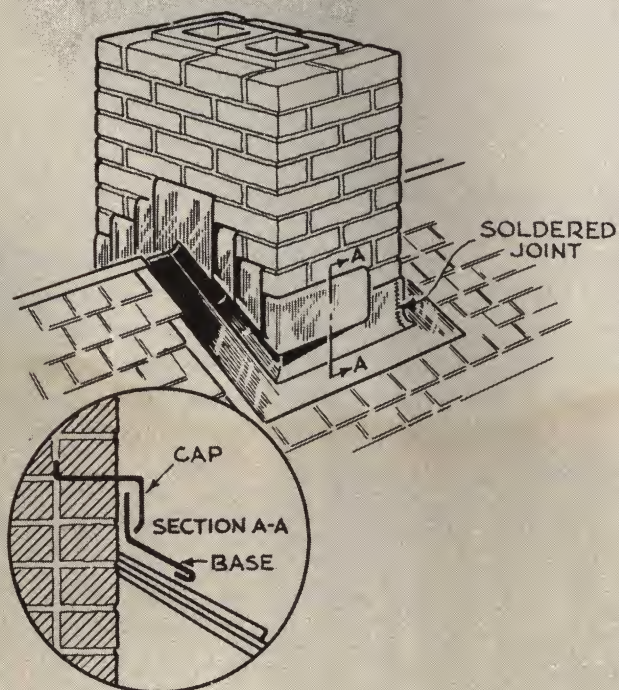


dormer

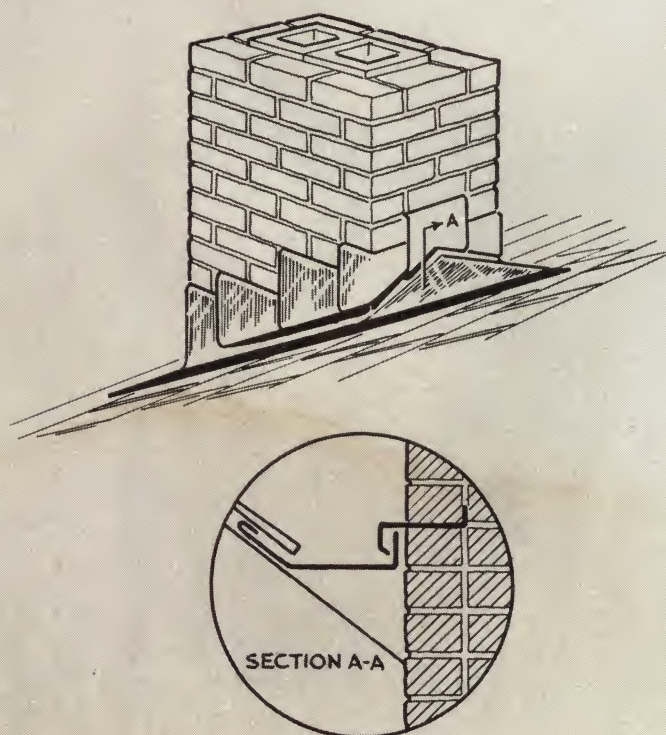


sidewalls

chimneys



on ridge of roof



cricket

dormers

Construction of dormer window flashings may vary depending on the appearance desired. In the basic installation, however, the intersection of the dormer and main roof forms a valley and is flashed as such. The dormer sides are treated as sidewall flashings, being either in short sections or steps, depending upon the pitch of the roof.

sidewalls

Where a roof abuts a vertical wall of a frame building, the flashing should be of the same construction as for a closed valley. With a brick or masonry wall a separate cap flashing should be installed as shown for chimney flashing.

ridge and hip

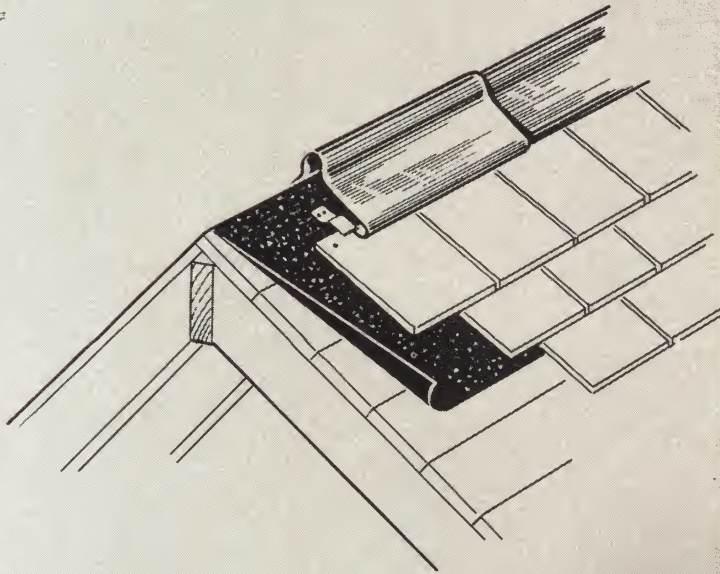
Construction is identical for both ridge and hip. Lower edges of sections are held to the roof by clips. Sections should overlap at least 3 inches away from the direction of prevailing winds to avoid the possibility of water being driven under laps.

chimneys

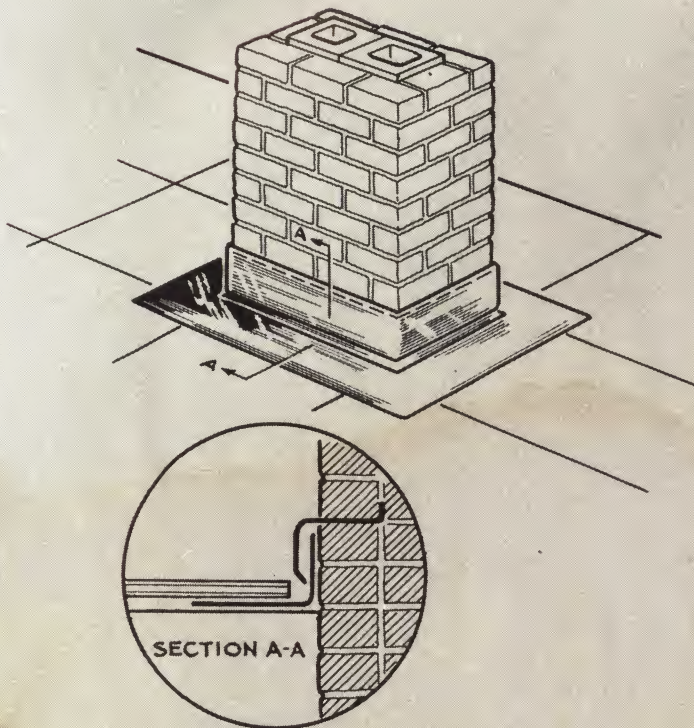
Construction of the base flashing differs with the location of the chimney on the roof. At the low end the flashing should extend four to six inches over the shingles. The lowest base flashing on each side folds around the corner of the chimney and is soldered to the base flashing at the foot of the chimney. Separate flashings, serving as base flashings up the sides, are inserted with each course.

Cap flashing is the same, except for dimensions, regardless of the location of the chimney. Along the low side or sides, where flashing is horizontal, it is of one piece construction but on the sides of the chimney the flashing is in short pieces arranged in steps according to the pitch of the roof. Separate sheets should have side laps of at least 3 inches in the direction of the roof slope and should lap the base flashings at least 4 inches.

A cricket is recommended for the back of the chimney. It should be noted that at the foot of the chimney the flashing is on top of the roofing, whereas at the back of the chimney, the roofing is on top of the flashing.

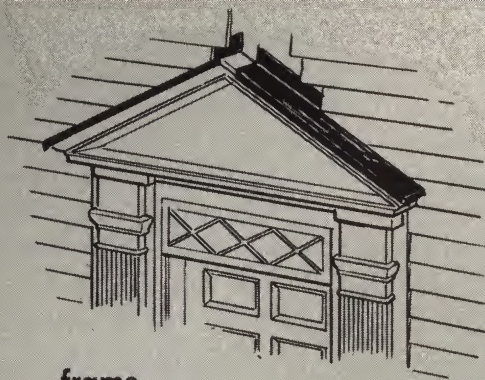


ridge or hip



on flat deck

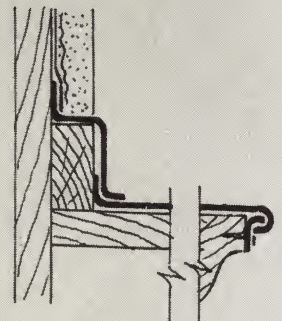
flashing-doors • windows



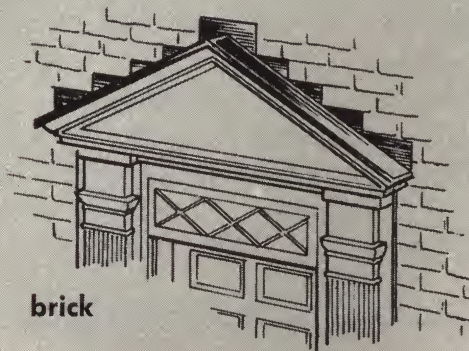
frame



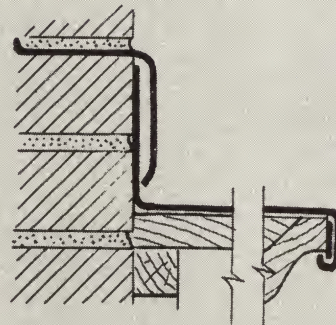
frame



stucco

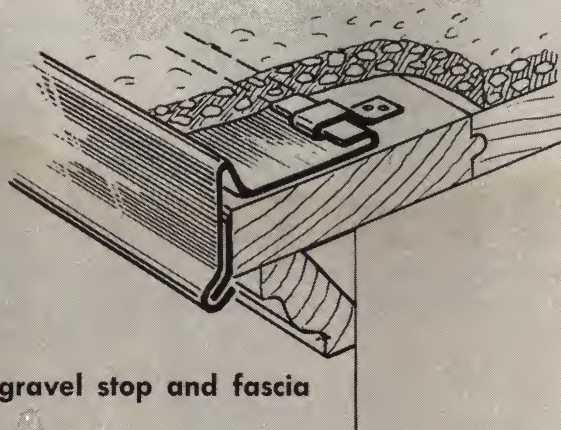


brick

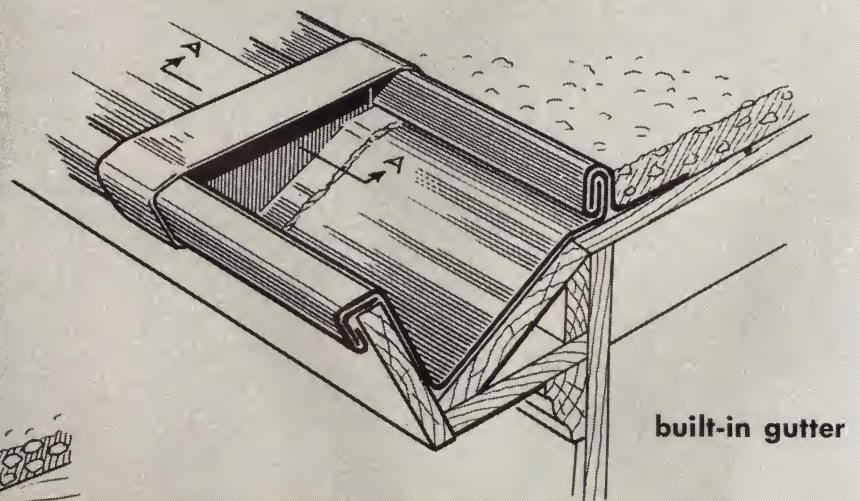


brick

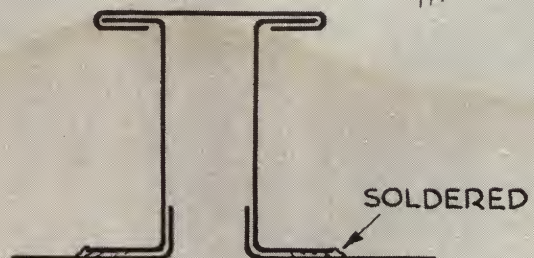
leaders and gutters



gravel stop and fascia



built-in gutter



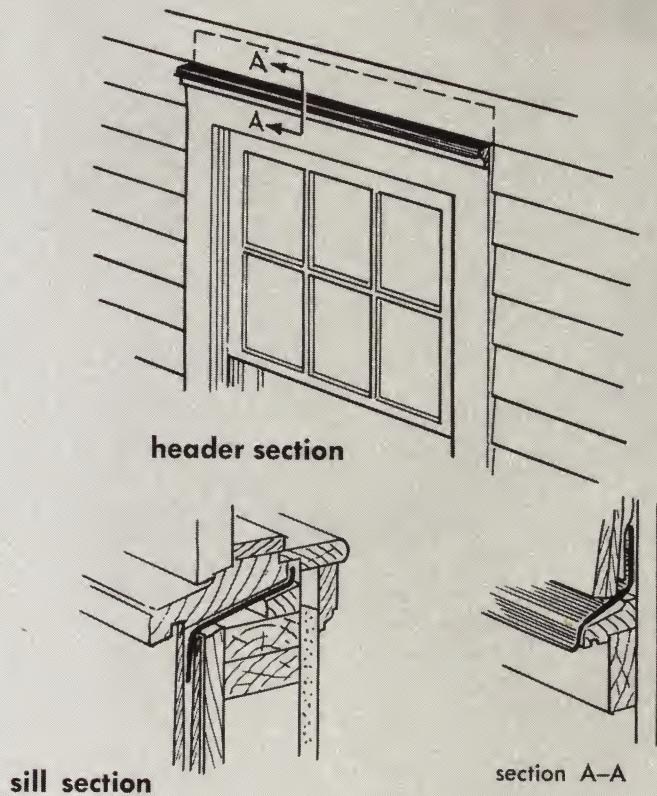
SOLDERED

section A-A

expansion joint

ZINC flashing leaders and gutters

2a
Am



flashing • doors • windows

The use of zinc flashings around doors and windows is recommended practice. Typical installations are illustrated.

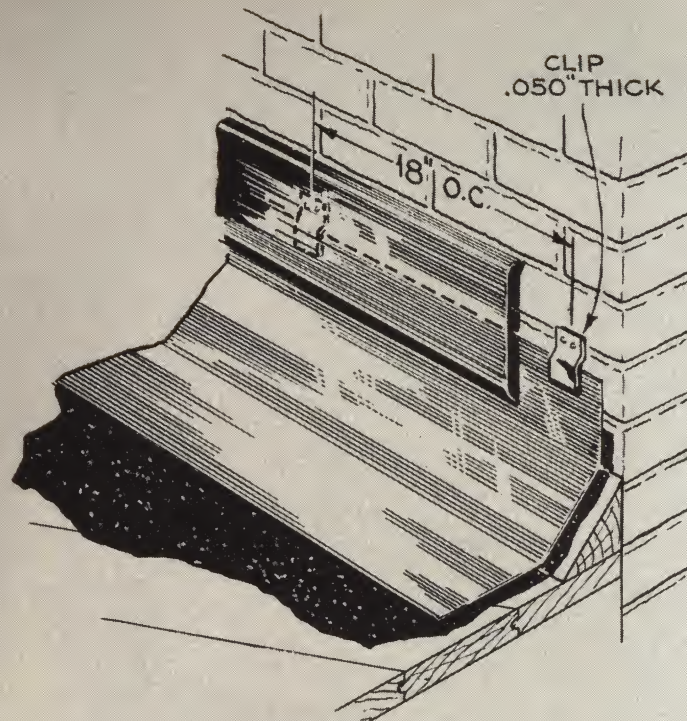
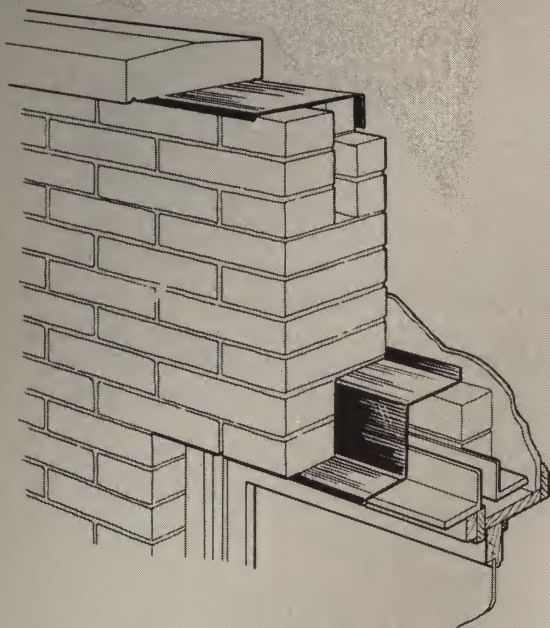


leaders and gutters

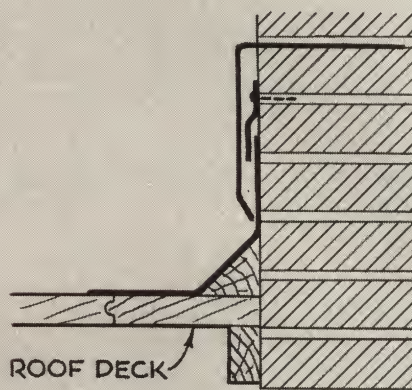
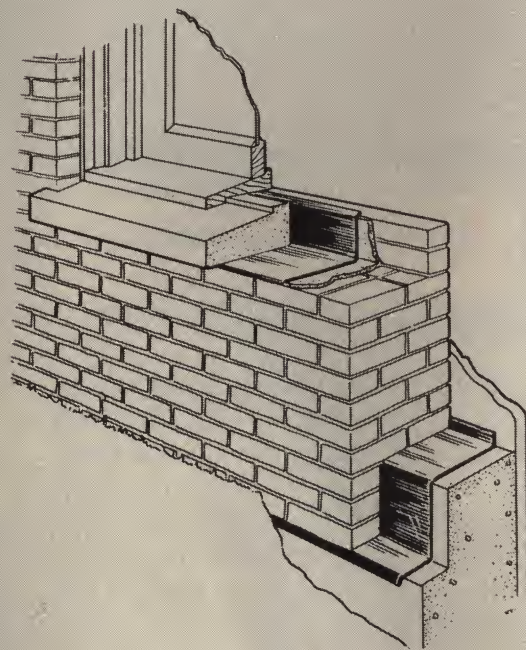
Zinc, due to its excellent working properties, appearance and durability is especially well suited for rain carrying equipment. Gutters may be either the hanging type (free from the roof), or the box type (actually part of the roof). They should be made of .032 inch zinc or heavier. Hanging gutters are fabricated in sections not over 10 feet long and are supported by hangers not over 18 inches on center. Box gutters should be constructed with expansion joints placed at intervals of not more than 20 feet apart. These are located at the high point of pitch, thus forming complete dams. Each section must have its own outlet.

Leader pipes and fittings are made in round or square types either plain or corrugated.

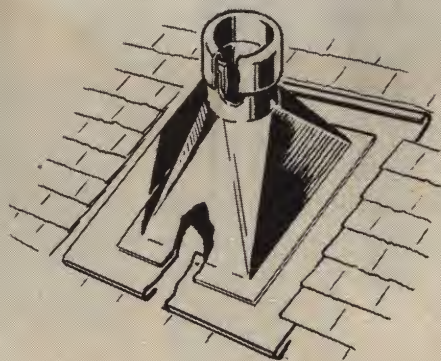
thru-wall flashing



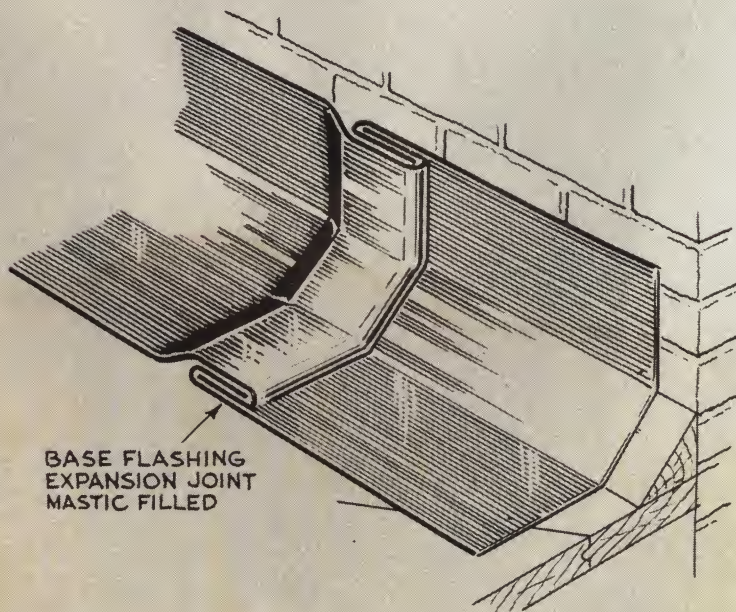
cap and base



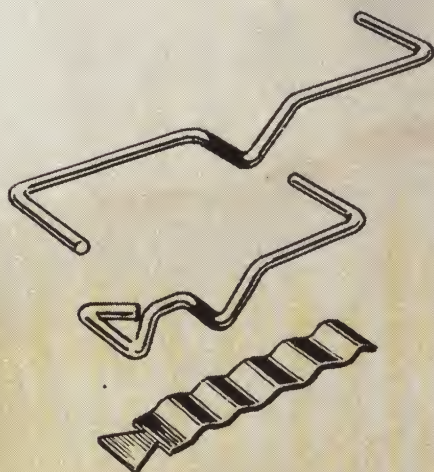
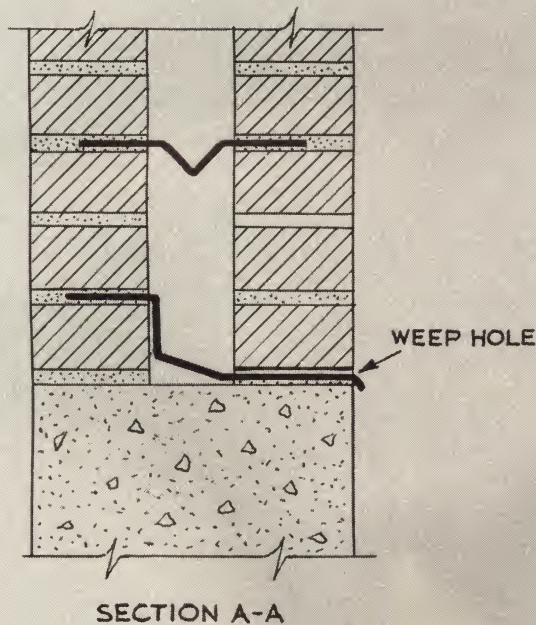
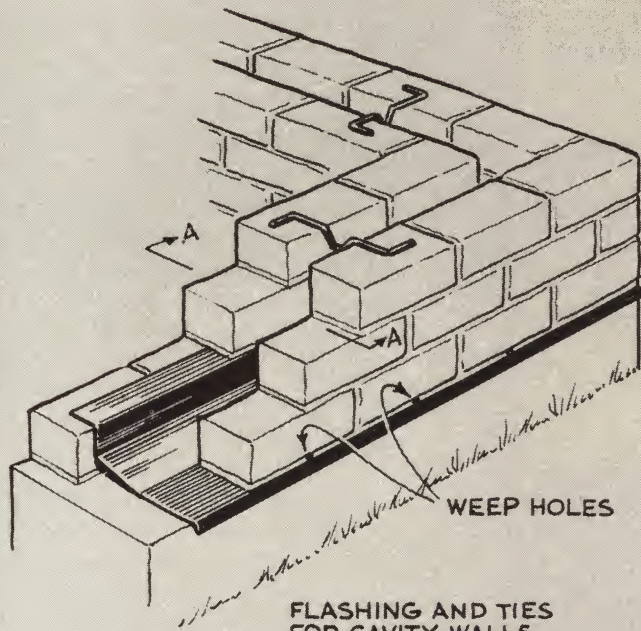
sectional view, cap and base



vent pipe



cavity wall flashing



wall ties

ZINC thru-wall flashing wall ties

2a
Am

flashings

thru-wall

Zinc, which can be used in contact with cement, is pliable enough to conform to any installation surface, yet stiff enough to make a rigid turn up on the inside of the wall. It is recommended that these flashings extend to within $\frac{1}{2}$ inch of the exterior wall face and turn up 2 inches on the interior wall face. Since zinc will not discolor masonry, no additional coating is required.

cavity wall

Zinc is particularly adaptable for cavity wall flashings as a means of collecting condensed moisture from within the wall and directing it to the outside. Zinc blends well with the wall and will not discolor the seepage. For most satisfactory service the flashing should be installed in the wall with a bed of mortar above and below the metal. Cavity wall flashings assure the proper drainage necessary to prevent water from penetrating into joints and crevices.

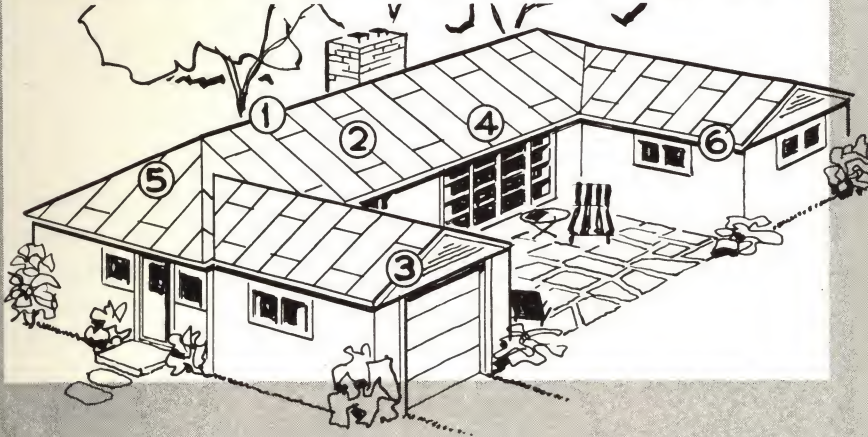
wall ties

Wall ties are a necessary part of the installation when cavity walls are used in a building. Zinc ties in the form of rods and similar shapes are set in the mortar joints and give a high strength bond in the wall construction.

vent pipe

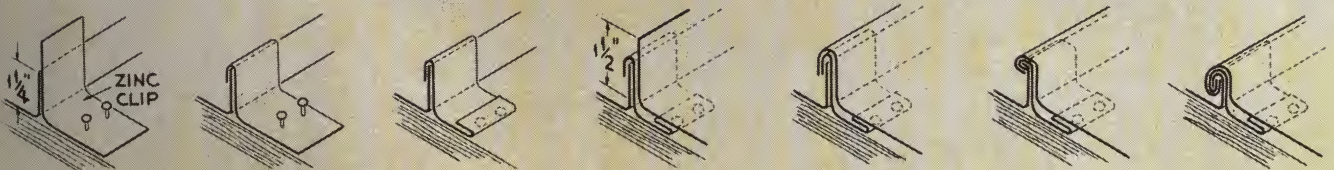
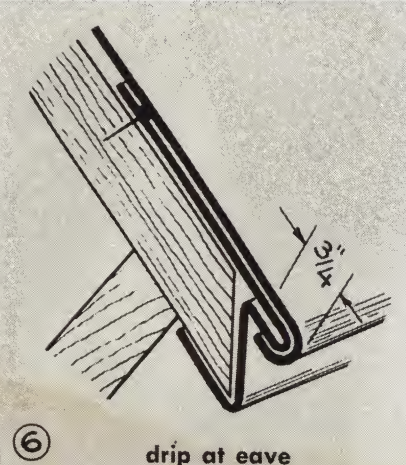
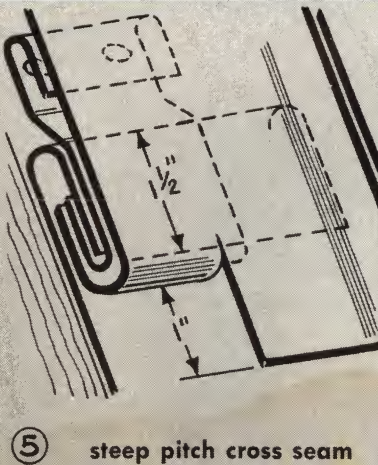
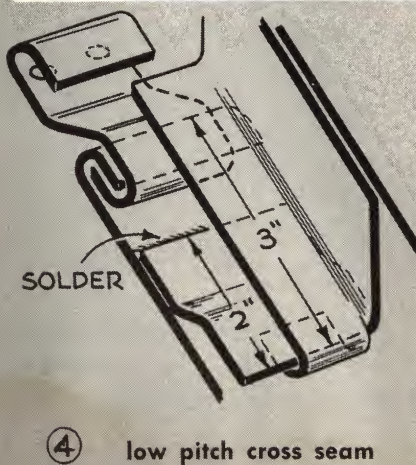
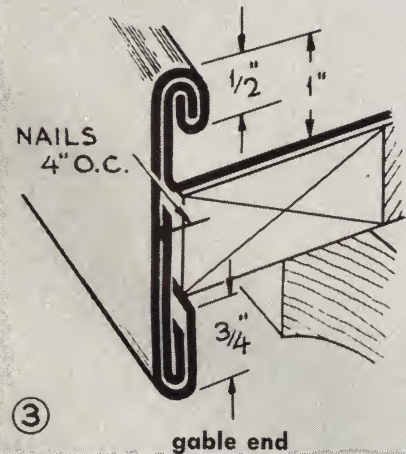
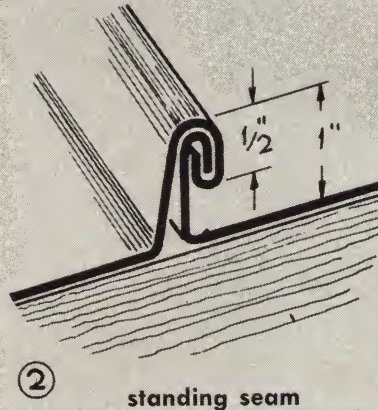
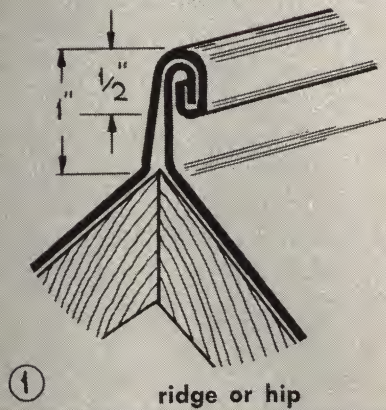
Base flashing is a prefabricated cone or in the form illustrated. It is topped with a cap flashing soldered or fastened to the vent pipe to form a watertight joint.

complete roofs of zinc—standing seam



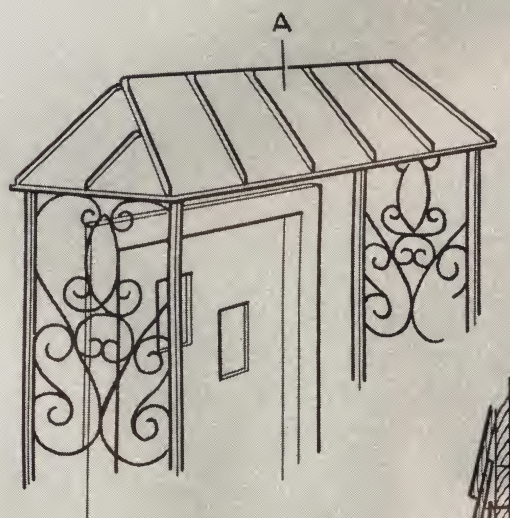
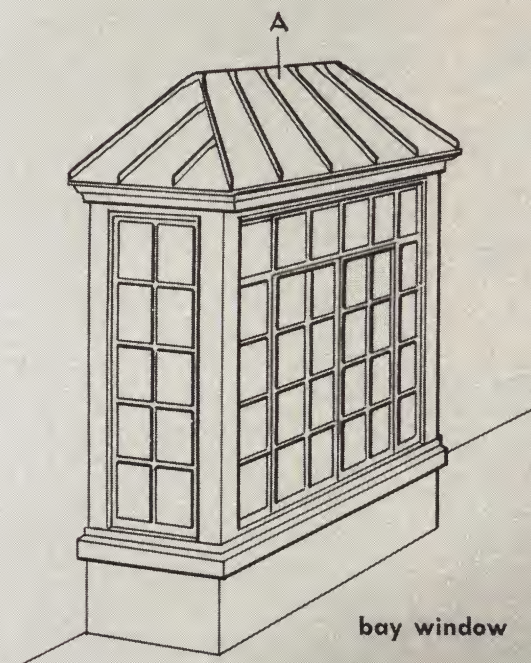
standing seam roofing

The standing seam system is one of the most familiar roofing methods and is especially adaptable for smaller type constructions such as bay windows, dormers, etc. Attractive and durable, it can be installed on any roof which has a slope of 4 inches per foot or more.

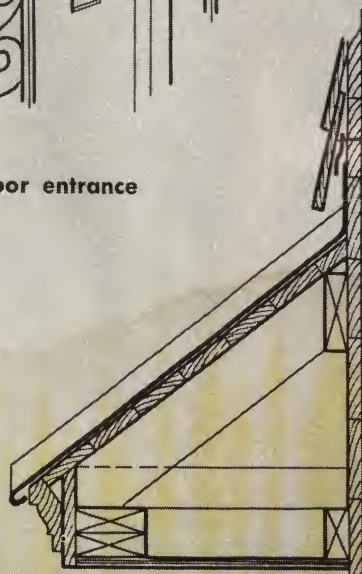


progressive steps in forming a standing seam

roofs of bay windows and porches



door entrance



section A.

ZINC standing seam roofing

roofs of zinc

All roofing must be laid on a smooth, unobstructed surface, covered with asphalt saturated and coated sheathing paper with a glossy surface. It is recommended that .024 inch or heavier zinc be used in narrow widths. The zinc may be obtained in either sheets or coils, the latter to be cut into lengths of not more than 8 feet.

The steps used in forming a standing seam are illustrated. One side of each roofing sheet is bent up $1\frac{1}{4}$ inches, the other side bent up $1\frac{1}{2}$ inches. Zinc clips, of the same gauge, 1 inch wide by 3 inches long are nailed to the roof at 8 or 10 inch intervals, using two nails per clip. The free end of the clip is folded over the nail heads to avoid puncturing the roof sheets. The next sheet is laid against this and the final seam is made by bending.

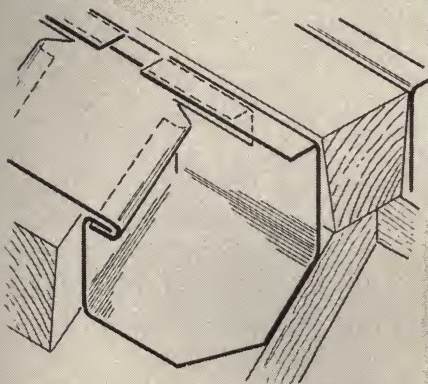
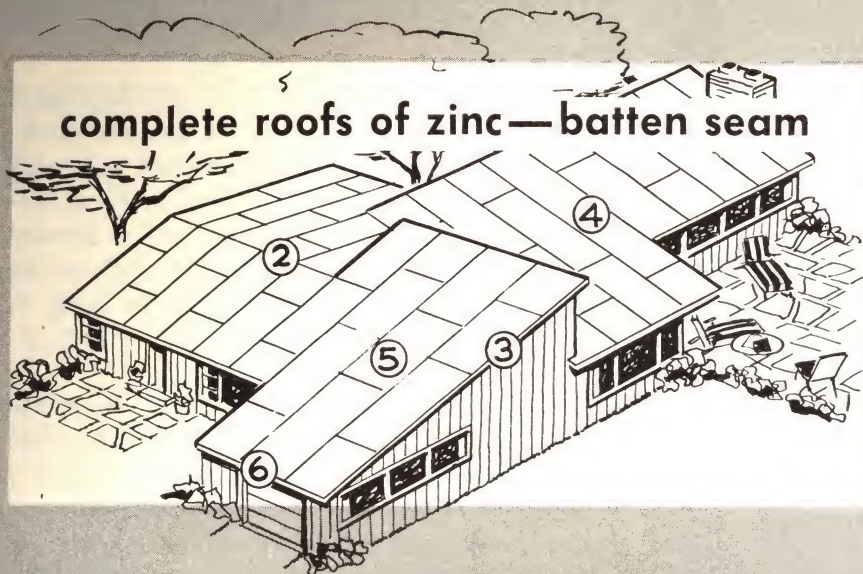
The construction of the cross seams depends on the slope of the roof. For slopes greater than 6 inches per foot, single lock joints may be used. For slopes of 4 to 6 inches per foot, double loose-lock joints with a covering of 3 inches are recommended. In either case the top end of each sheet is held in place by at least two clips as illustrated.

At the ridge, any one of four methods may be used: a ridge batten, a standing seam ridge at right angles to roof seams, a lock seam formed by sheets of two roofing slopes, or a ridge cap without a batten. The same type of construction is used at the hip.

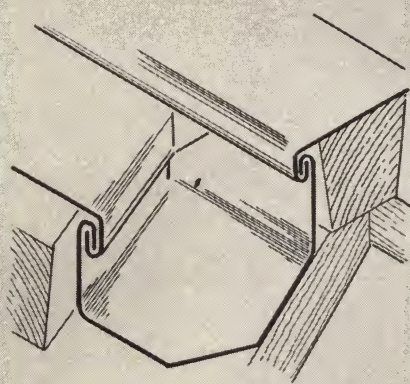
Either of two types of construction may be used for the gable end of a roof. In one, the roof strip is turned up vertically and locked into zinc edging clips, not over 2 feet long and wide enough to extend to a height at least equal to that of a finished standing seam. Long clips, .050 inch thick, are nailed together so closely as to be practically continuous. In the other method, the edge is turned down over the edge of the roof boards and hooked into the clips.

At the eaves, a zinc edge strip is secured to the roof and locked to the zinc roofing edge with a loose lock. When there is a box gutter, the roofing strips are connected to it by a double loose-lock joint, which is illustrated for valley flashing on page 5.

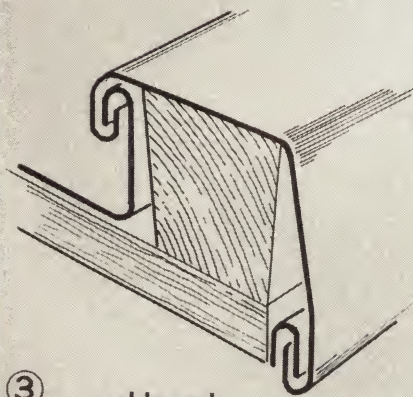
complete roofs of zinc—batten seam



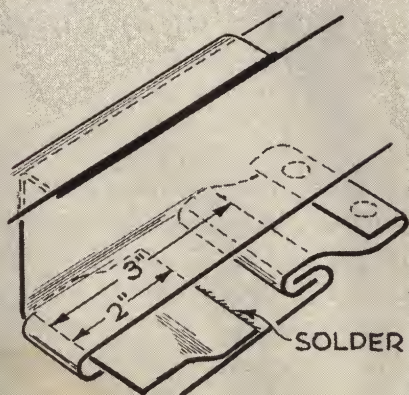
① ridge start



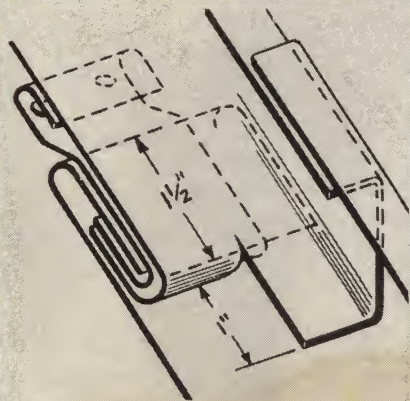
② ridge completed



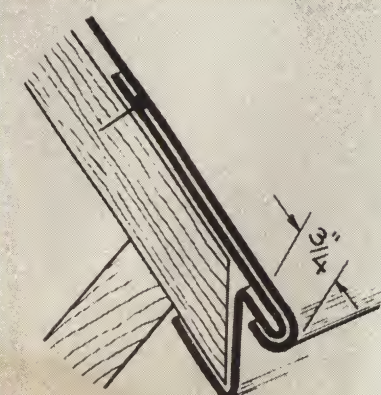
③ gable end



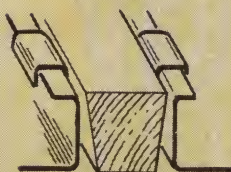
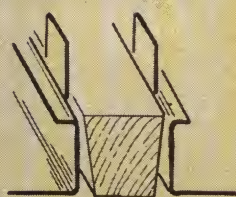
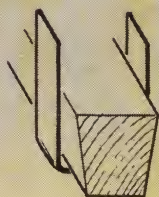
④ cross seam — low pitch



⑤ cross seam — steep pitch

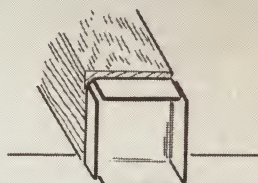


⑥ drip at eave

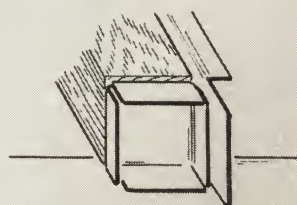


progressive steps in forming a batten seam

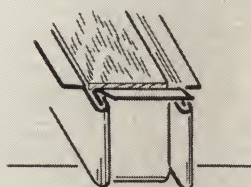
flashing ends of wood battens



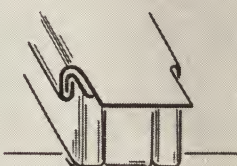
end piece
same shape as batten



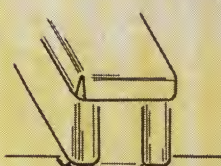
end piece in position



bottom tab folded under eave
side tabs attached



batten cap attached



completed end

batten seam roofing

Attractive in appearance and long lasting, the batten seam system of roofing is used for ranch type houses and similar structures. The zinc batten roof will weather to a natural gray tone, or, if desired, a choice of color effects may be obtained by painting. The roof may be painted immediately after installation if Metallic Zinc Paint (Zinc Dust-Zinc Oxide) the recommended paint for zinc surfaces, is used.

In this system, the metal is laid between parallel wooden strips which run from ridge to eaves. The zinc sheets must be laid over asphalt saturated and coated sheathing paper with a glossy surface.

Standard battens are not less than $1\frac{5}{8}$ inches high for slopes of 4 inches per foot or more. For slopes less than this the batten should be $2\frac{5}{8}$ inches high to avoid water leakage.

When battens are spaced up to 18 inches on center, use a minimum of .024 inch zinc. For wider spacing, heavier zinc should be specified.

Before battens are nailed in place, long clips of .050 inch zinc are nailed at 18 inch intervals under the batten and bent over the roofing sheets. Capping pieces, in 36 inch lengths, are slipped over the tops of the battens and locked into the clips. The ends of the caps should overlap at least 4 inches. It is important that battens be securely fastened to the roofing boards, and be accurately spaced and parallel throughout their entire length.

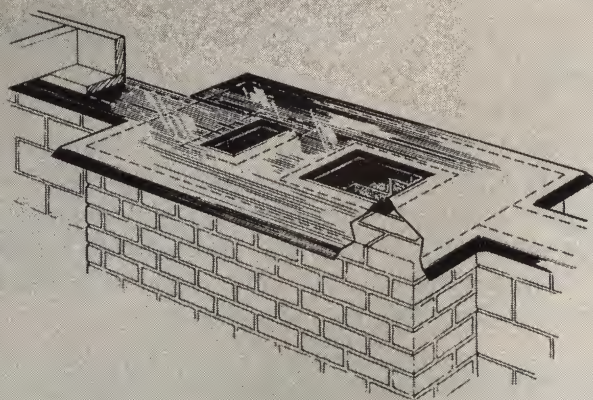
At the ends of wood battens, the end pieces of roofing sheets are cut to form tabs which fold over a formed end piece as shown in the illustrations.

For steep pitch roofs, cross seams are made by folding the lower end of the upper sheet 1 inch and hooking it into a $1\frac{1}{2}$ inch fold on the upper end of the underlying sheet. The top end of each sheet is held in place by at least two clips.

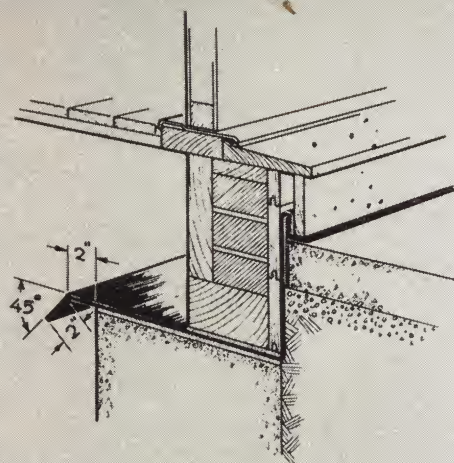
For low pitch roofs the fold on the lower sheet engages clips that hold it in place as illustrated. The fold on upper sheet hooks into a 2 inch wide lock strip (same thickness as roofing sheet) that is soldered to lower sheet as shown.

A ridge batten must be $1\frac{1}{4}$ inches above the roof batten. At the intersection of roof and ridge the roof sheets and ridge batten are joined as illustrated.

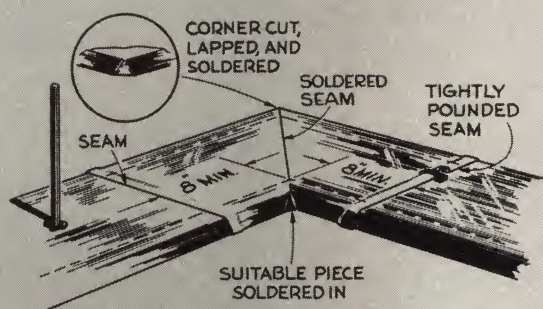
termite protection



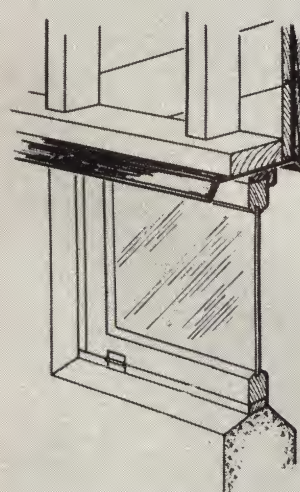
chimney at sill



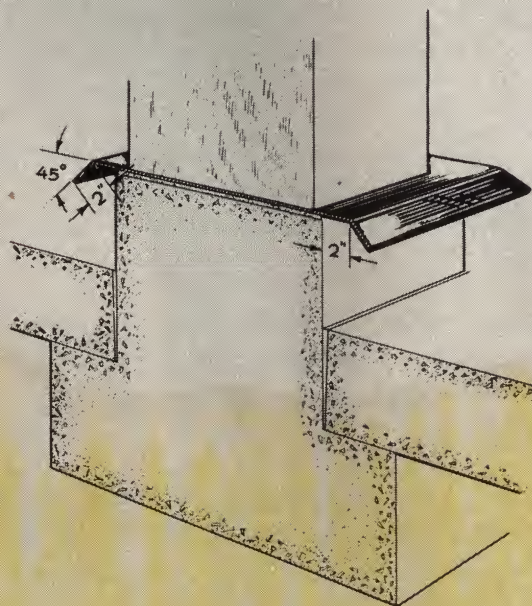
porch entrance



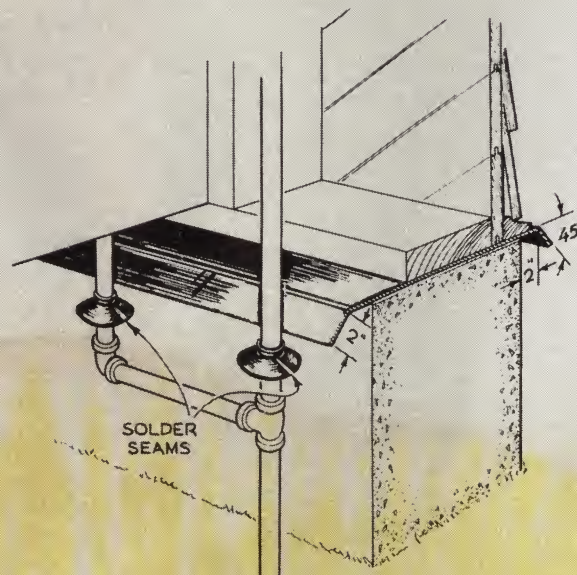
construction details



cellar window

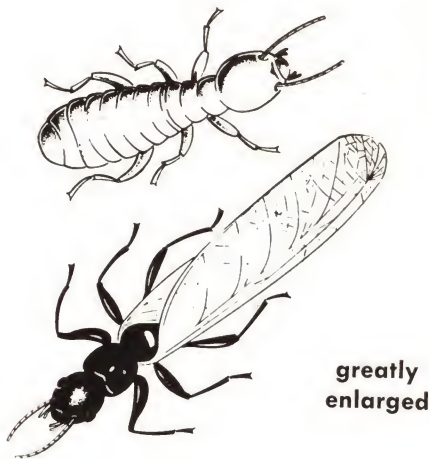


sectional view of foundation post



shields on foundation and around pipes

termite protection



Zinc is ideal for termite shields because it is rust proof, impervious to the effects of moisture or other adverse climatic conditions, readily formed without becoming brittle, safely installed in mortar, and lasts as long as the building itself.

Simple and inexpensive, zinc shields provide an effective safeguard against termites by preventing their entry from the ground and also cutting off their return to the soil to obtain the water necessary for their survival. Since these insects cannot bend their bodies to crawl around the metal edge, the shields act as definite barriers.

Zinc termite shields for longtime service should be at least .018 and preferably .024 inch thick to provide the stiffness and strength necessary to hold its shape. Lengths of each section should not exceed 8 feet, and should be connected with a single lock joint malleted down tightly. It is recommended that the metal extend 2 inches horizontally beyond the face of the foundation walls at both sides, each projection turned down an additional 2 inches at a 45 degree angle. These shields are especially adaptable to locations not easily accessible for inspection. Other forms can be constructed for installations more readily inspected.

It is necessary that a complete zinc termite shield be installed around the entire foundation, at all possible points where insects might gain entry to the woodwork of the building. Particular attention should be paid to masonry foundations, fireplace walls, piers, cellar windows, wood plate and sills, cellar hatchways, posts, walls, cellar beam pockets, piping, cellar partitions, and between steps and porch of house.

Protective shields should be installed when the house is being constructed. Additional expense will necessarily be incurred when shielding is installed in existing structures, but the extra costs are minor in comparison to damage resulting from termite attack.

Destruction by termites is responsible for more than \$50 million damage to American property each year. This damage can be reduced considerably by the use of zinc shields which present a durable barrier to termite attack at all points where insects invade buildings.

Termites are tiny insects which nest in the moist ground and cannot tolerate exposure to light. Their existence depends upon wood or other cellulose products and when this food supply is not in contact with the soil they will travel to it. Through crevices or tunnels which they construct from earth and other wastes, they crawl over brick, concrete, pipes and other materials which they cannot attack. Boring from within, they eat through the wood members of a building, and through rugs, clothing, paper, etc., without discovery, until irreparable damage has been done. Because of their small size, termites gain easy entry to a building through small cracks in the foundation, especially where wood comes into direct contact with the earth. Although wood is their food source, they cannot live without a supply of moisture. Breaking contact with this moisture leads to their destruction and elimination.

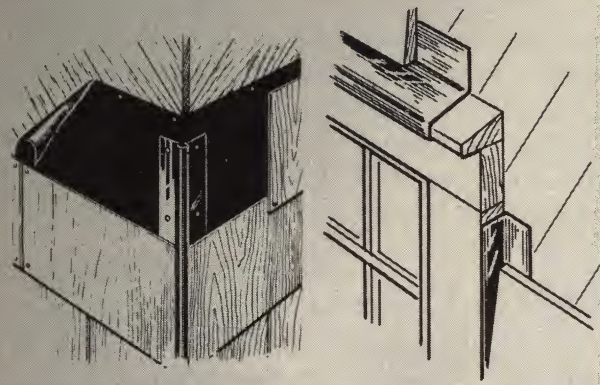
Other uses



weatherstripping

The moderate cost and rust free characteristics of zinc have made it the standard for weatherstripping. In countless installations, no sign of wear after 40 years of use is shown. Zinc requires no special surface preparation even in salt atmospheres. Zinc will not stain adjoining materials.

The inherent self-lubricating properties of zinc enable the engaging members to slide easily and without scraping or scoring. It will not oxidize to a hard abrasive surface which wears away. Because of its pliability, zinc weatherstripping will adjust to warping of window sash, avoiding binding and maintaining a satisfactory seal.



corner trim for siding

Zinc prefabricated mouldings are used extensively on corners of buildings, around windows, etc. Their non-staining qualities and appearance make them suitable for new constructions or remodeling, especially when used in conjunction with asbestos or asphalt shingles.



corrugated sheets

Corrugated zinc sheets are used successfully in farm and industrial construction. Rolled zinc producers supply specially alloyed zinc sheets for this purpose. The alloying provides greater rigidity than obtained in commercial grades of zinc. Roofing and siding sheets may be applied over open or fully sheathed surfaces. It is suggested that manufacturers be contacted for their recommendations and specifications.



terrazzo strip

Zinc is the most economical dividing strip material for terrazzo floors. It has outstanding color appeal as this "white metal" blends well with all types of terrazzo and modern architectural fittings and retains its bright finish. Zinc is unaffected by the strong soaps or detergents used for cleaning floors. With the passing of time, zinc strips will wear uniformly with the marble chip aggregate in terrazzo, thus there are no projections above the floor surface to present walking hazards. Zinc terrazzo strips are available in all widths to meet architectural requirements.

Technical Data

thermal properties

melting point
787°F.

boiling point
1663°F.

coefficient of linear expansion (ex-
pansion per unit length)
.0000221 per °F.

thermal conductivity
.27 calories/sq.cm/cm/°C/ per
second (at 64°F.)

electrical conductivity

specific—169,000 mhos/cm³ at
68°F.

per cent—28 (copper 100)

specific gravity
7.1

density

.258 lbs. per cubic inch

dimensional tolerances

Sheet and strip zinc is furnished to
tolerances indicated in the Ameri-
can Society for Testing Materials
Specification B-69 which conforms
to the United States Government
Specifications MIL-Z-883 (ships).

table of weights, thicknesses and gauges

Zinc gauge			Manufacturers' Standard Gauge for sheet steel		American or Brown & Sharpe	
no.	ounces per sq. ft.	thickness in inches	no.	approx. thickness in inches	no.	approx. thickness in inches
9	10.72	.018	26	.0179	24	.0201
10	12.00	.020	25	.0209	23	.0225
11	14.40	.024	24	.0239	22	.0253
12	16.80	.028	23	.0269	21	.0284
13	19.20	.032	22	.0299	20	.0319
14	21.60	.036	21	.0329	19	.0358
15	24.00	.040	20	.0359	18	.0403
16	26.88	.045	19	.0418	17	.0452
17	29.92	.050	18	.0478	16	.0508
18	32.96	.055	17	.0538	15	.0570
19	36.00	.060	16	.0598	14	.0640
20	41.92	.070	15	.0673	13	.0719
21	48.00	.080	14	.0747	12	.0808
22	53.92	.090	13	.0897	11	.0907
23	60.00	.100	12	.1046	10	.1018
24	75.20	.125	11	.1196	9	.1144

When ordering specify decimal thickness to avoid error

How to Order Sheet and Strip Zinc

Inquiries or orders for Sheet and Strip Zinc should
always specify pounds or number of pieces, thick-
ness in decimals of an inch, width and length in
inches, intended use, and packing desired.

Misunderstanding can be avoided when ordering
by specifying thickness in decimals of an inch rather
than by gauge number.

Zinc is available in the following thicknesses, widths,
and lengths for general building purposes.

Zinc Sheet (.018 inch or thicker)

up to 60 inches wide

up to 96 inches long

Zinc Strip (.018 inch or thicker)

up to 20 inches wide

In flat lengths up to 144 inches long

In coils—length as desired.

Note: Zinc is available in two general temper
classifications:—soft and medium hard. For most
building purposes soft temper zinc is generally
used. For a wider range of temper and special
characteristics, zinc alloys are commonly supplied.

The American Zinc Institute, a non-profit organization, is the national trade association of the Zinc industry, including the miners, smelters, and rollers of Zinc. The Institute does not produce or sell Zinc, but collects and distributes information relative to the uses of Zinc and Zinc products.

producers of sheet and strip zinc

The American Zinc Products
A Division of Ball Bros. Co., Inc.
Greencastle, Indiana

Illinois Zinc Company
2959 West 47th Street
Chicago 32, Illinois

Matthiessen & Hegeler Zinc Company
La Salle, Illinois

The New Jersey Zinc Company
160 Front Street
New York 38, New York

The Platt Brothers & Company
Waterbury 20, Connecticut

American Zinc Institute, Inc.
60 East 42nd Street New York 17, New York

Field Office • 324 Ferry Street, Lafayette, Indiana

